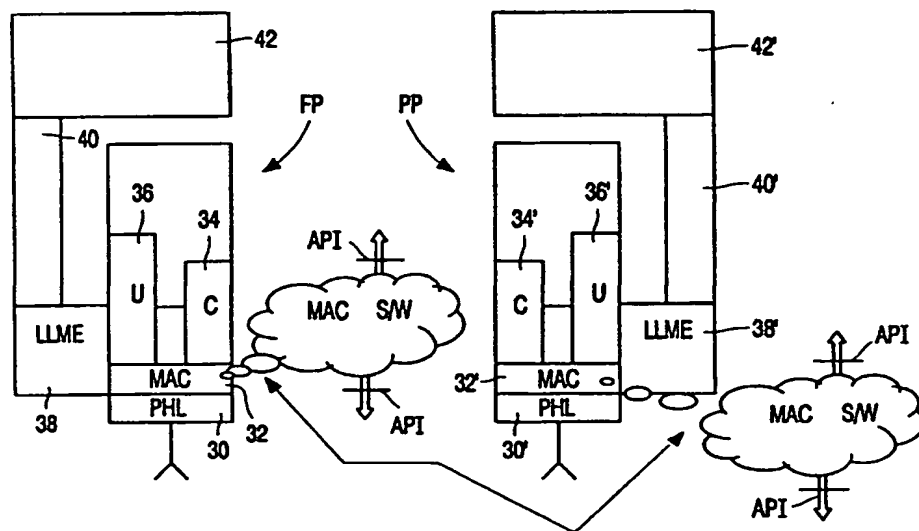




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71) Applicant: KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).			
(72) Inventors: BUCKNELL, Paul; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). MOULSLEY, Timothy, J.; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).			
(74) Agent: MOODY, Colin, J.; Internationaal Octrooibureau B.V., Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).			

(54) Title: RECONFIGURABLE COMMUNICATION NETWORK



## (57) Abstract

A communication system comprises first and second terminals (FP, PP) which are able to communicate at least control messages to each other. At least one of the first and second terminals has means for configuring/reconfiguring itself by a process of service negotiation with the other of the first and second terminals. Each of the terminals comprises a transceiver, a memory for storing software functions, and a processor for controlling the operation of the terminal in accordance with stored software functions. At least one of the software functions is alterable in response to the receipt of a control message containing the new software function plus interface software required by the processor in building a new function into an actual implementation on the terminal. The communication system may be a cordless and/or cellular telephone system in which the configuration/reconfiguration messages are sent over-the-air or a corded system in which configuration/reconfiguration messages are relayed by landline.

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## DESCRIPTION

### RECONFIGURABLE COMMUNICATION NETWORK

#### Technical Field

5       The present invention relates to a configurable/reconfigurable communication network which is, or terminals of which are, configurable or reconfigurable in response to data transmitted for example by corded or cordless, say over-the-air, link.

#### Background Art

10       It is known from Philips Telecommunication Review, Vol. 41, No. 1, April 1983 "FM-900 series of VHF/UHF mobile radio telephone equipment" by F.P. van Enk, pages 36 to 45 to provide mobile radio units with microprocessors and a central control PROM (programmable read only memory) whereby personality data associated with a channel number can be stored. As a  
15       consequence, when a user selects a channel, the mobile radio unit adapts itself in accordance with the stored data so that it is ready to operate without any further intervention by the user. Such a radio unit requires the PROM to be programmed using an external programmer.

20       It is also known to supply data, such as receiver identity codes, to digital pagers by over-the-air transmissions.

25       In the field of telecommunications, particularly digital paging, in order to enable a user to roam in different geographical areas which operate different systems and/or different characteristics it was necessary for a traveller to carry two or more portable units, each of the portable units being configured to operate in a respective area. One proposal for avoiding the need to carry  
several portable units is disclosed in European Patent EP-B-0 538 933. The portable unit is able to be reconfigured in response to data downloaded from a device, for example a plastics card carrying the data, inserted in an aperture or slot and read by the portable unit.

30       In view of the plethora of communications standards in force and coming into force it is desirable for equipment at each end of a link to be compatible.

### Disclosure of Invention

According to a first aspect of the present invention there is provided a method of operating a radio system comprising first and second terminals, the method comprising configuring/reconfiguring one of said first and second terminals by a process of service negotiation with the other of said first and second terminals.

More particularly the first aspect of the present invention provides a method of operating a radio system comprising first and second terminals, the method comprising one of said first and second terminals transmitting a message giving parameters relating to its capabilities, and the other of the first and second terminals receiving the message and configuring/reconfiguring itself in accordance with the received parameters.

According to a second aspect of the present invention there is provided a communications system comprising first and second terminals which are able to communicate with each other, wherein at least one of the first and second terminals has means for configuring/reconfiguring itself by a process of service negotiation.

The second aspect of the present invention also provides a communications system comprising first and second terminals which are able to communicate with each other, wherein at least one of the first and second terminals has means for configuring/reconfiguring itself in response to the receipt of a message transmitted by said other of the first and second terminals giving parameters relating to its capabilities.

According to a third aspect of the present invention there is provided a terminal for use in a communication system in which one terminal can configure/reconfigure another terminal by service negotiation, the terminal comprising a transceiver, a memory for storing software functions, and a processor for controlling the operation of the terminal in accordance with stored software functions, at least one of the software functions being alterable in response to the receipt of a message containing the new software function plus interface software required by the processor in building a new function into an actual implementation on the terminal.

The present invention is based on the concept that the primary station (or fixed terminal) can adapt itself in response to software (or other information) relayed over a communications link by a secondary station (or mobile terminal), and vice versa. Thus provided that the primary station or secondary station is capable of adapting or configuring/reconfiguring itself, it is possible for a range of equipments to be able to operate on a network without having to be set-up in advance in a factory. This is of particular importance when the same piece of equipment has to be capable to operate not only with different radio interfaces, protocols, compress/decompression algorithms and applications but also it has to be able to be agile in its operation to suit the prevailing radio environment.

An application running on a mobile terminal (or secondary station) and requiring communications facilities will normally need to establish a connection with another (peer) application on a remote terminal (or equivalent). The network may offer a standardised service tailored for the application and thus provide a communication channel with appropriate properties, for example (bit rate, delay, error rate and so forth). However, it may be that the application will be unknown to the network, and therefore the "nearest" suitable service could be offered. This would require some negotiation to take place between the terminal and network on the required and available link parameters. In another application the terminal may take an active part in configuring/reconfiguring the network to provide the required communications facilities.

In a radio system it is usually desirable to jointly optimise the source and channel coding. Therefore, if the source coding algorithm is unknown to the network, it is likely that the associated channel coding will also be unknown. Therefore the necessary information must be provided to the network to allow implementation of an effective solution. The same argument can be applied to the modulation scheme.

In some cases there may be more than one network involved in setting up a connection. Then the properties of each link should be considered, as well as the overall performance.

The uploading could be between terminals, for example to ensure that the applications at both ends of the link are compatible.

#### Brief Description of Drawings

The present invention will now be described, by way of example, with  
5 reference to the accompanying drawings, wherein:

Figure 1 is a general diagram of a cordless/cellular telephone system,

Figure 2 illustrates in block schematic form the software architecture of a reconfigurable DECT (Digitally Enhanced Cordless Telephone), fixed part and portable part, and

10 Figure 3 is a diagram of the software download procedure.

In the drawings the same reference numerals have been used to indicate corresponding features.

#### Modes for Carrying Out the Invention

Referring to Figure 1, the communication system comprises a fixed part  
15 (or fixed terminal) FP and two portable parts (or mobile terminals) PP1, PP2. The fixed part FP comprises a network controller 10 which is effectively a large computer and which is coupled to a radio transceiver 12. An antenna 14 is coupled to the transceiver 12. Each of the portable parts PP1, PP2 comprises an antenna 20 coupled to a radio transceiver 22. A processor 24 having an  
20 EPROM 26 for storing configuration data is coupled to the transceiver 22.

For convenience of description, the illustrated system operates in accordance with the DECT (Digitally Enhanced Cordless Telephone) Standard. DECT is a TDMA standard comprising ten frequency channels, each channel being divided in the time domain into frames and each frame  
25 comprises 24 time slots, 12 being transmit time slots (or simplex physical channels) and 12 being receive time slots (or simplex physical channels). Correspondingly numbered transmit and receive time slots constitute a duplex voice pair.

As is known in the art DECT operates in accordance with a layered  
30 structure which comprises a Physical (PHL) layer, a Medium Access Control (MAC) layer, a Data Link Control (DLC) layer and a Network (NWK) layer. Some of the features of the PHL layer have been described in the previous

paragraph. Of the other layers the MAC layer is of interest. The MAC layer specifies the broadcast message control service, the connectionless message control service and the multibearer control service. The MAC layer also specifies the logical channels and how they are multiplexed and mapped onto the physical channels. More particularly the MAC layer performs two main functions, firstly it selects physical channels, and then establishes and releases connections on those channels. Secondly it multiplexes (and demultiplexes) control information, together with higher layer information and error control information, into slot-sized packets. In the interests of brevity the DLC and NWK layers will not be described.

Referring to Figure 2, there is shown the software architecture of a DECT based reconfigurable fixed part (or base station) FP and portable part (or mobile terminal) PP. The respective software architectures are mirror images of each other and for convenience of description the fixed part FP will be described and the same reference numerals shown with a prime will be used to refer to the corresponding features in the portable part PP.

The FP software architecture comprises the Physical (PHL) layer 30, the MAC layer 32, a C-plane (or control plane) 34 and U-plane (or user plane) 36 interface with the MAC layer 32. A configuration application 42 interfaces with a configuration manager 40 which is attached to a lower layer management entity (LLME) 38. The process is controlled by the configuration application 42 which is a high-level user interface application running as a user application. This enables the PP or FP to access Internet based servers for the retrieval of software. Application Program Interfaces (APIs) are used to allow generic elements to be used on different manufacturers' equipment.

The configuration manager 40 has three main options which are (1) take one module out and replace with another while the software is running, so called "Hot swapping", (2) run and test a new stack simultaneously with the currently used stack prior to changing-over stacks, so called "parallel stack operation, and (3) stop a protocol stack, compile a new downloaded function, test the new function and established a new connection, so called "stop and

start". Option (3) is the simplest option and the one that is more likely to be used in practice.

In the case of the FP being reconfigured in response to proposals from the PP, the following software uploading is proposed.

5 (1) Negotiation of features. A dialogue between the PP and FP to ensure that both are aware of the relevant capabilities of the other. For example, PP may be interested in the end-to-end delay offered by the connection to the fixed network, or the bit error rate or packet loss rate in an ATM connection. There may also be a need for negotiation between  
10 terminals.

(2) Error handling. When a radio link is involved coding is likely to be a required for error detection and/or correction. The details of the coding (and interleaving) could be uploaded by the PP to the radio access part of the network (parameters or algorithm description). Similarly, decoding algorithms  
15 could be specified. Error detection and concealment mechanisms could be specified. Error concealment is applicable in real-time voice and video transmission. It could also be implemented at the end destination, and could include filling in missing data based on interpolation, or repetition of previous data, or in the case of speech, muting.

20 (3) Specialised automatic repeat request (ARQ) algorithms (or information specifying them) could be loaded into the network by the PP. This may be appropriate if real-time delay constraints need to be met, or to ensure efficient use of the communication channel (e.g. for large packets).

(4) Non standard modulations could be specified and algorithms  
25 provided to generate/demodulate them.

(5) Agents could be loaded into the network to handle communications issues on behalf of the user. Some examples include: transcoding (e.g. where the applications use different source coding algorithms), monitoring delay and quality of service.

30 (6) Specialised algorithms for packet handling could be specified (e.g. dealing with packet priorities, packet dropping under congested conditions).



(7) Encryption/decryption/electronic signature/watermarking algorithms could be uploaded to the FP by the PP.

The method and system in accordance with the present invention contemplates the possibility of the FP or PP being configured or reconfigured by software relayed by the other part. Apart from the changes already mentioned, the following elements may be reconfigured:

(a) Changing the mode of operation of a FP to a PP and vice versa which may be desirable in certain situations to cover short-lived events.

(b) In the case of the physical channel:

10 (1) Changing from single slot to multiple-slot (number of bearers of the physical channel) and vice versa.

(2) Changing the frame structure.

(3) Altering the Cyclic Redundancy Check (CRC) scheme.

15 (4) Changing or altering power control algorithms (not applicable to all cordless or cellular systems some of which, such as DECT, do not have provision for power control).

(c) Changing elements of the MAC layer software functionality:

(1) Altering the higher layers error control.

20 (2) Altering the Radio Signal Strength Indicator (RSSI) scheme.

(3) Altering the Automatic Repeat Request (ARQ) Scheme.

(4) Altering handover algorithms.

Thus it is possible to take a non-configured terminal or a configured terminal and to configure or reconfigure it with a desired profile. Configuration or reconfiguration can either be manual or automatic, for example link adaptation in difficult channel could occur automatically. To effect configuration or reconfiguration, a terminal may comprise a Field Programmable Gate Array (FPGA), a programmable processor or a dedicated Application Specific Integrated Circuits (ASICs) designed to operate differently dependent on external influences.

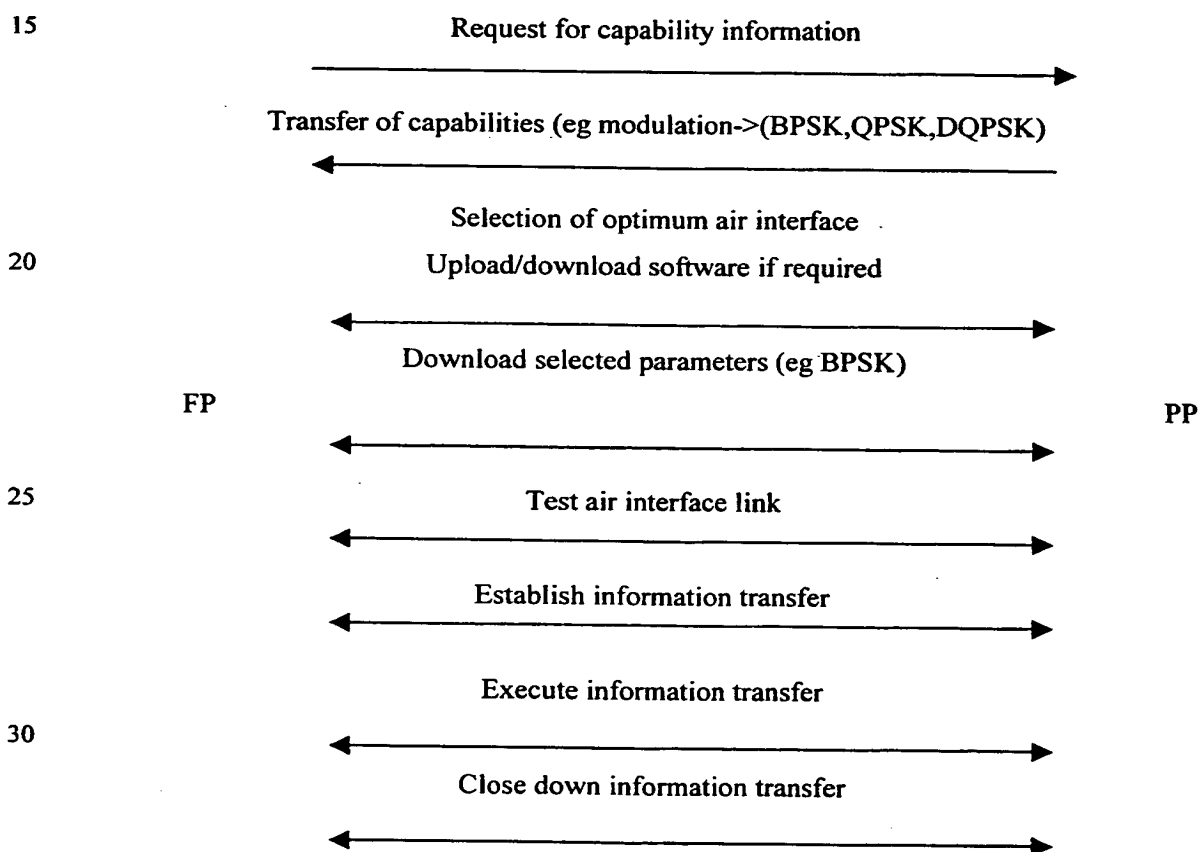
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The method in accordance with the present invention is facilitated by the transfer of key parameters from one terminal to the other terminal about it's

capabilities. Capabilities include the actual functions which are executed when a communications link is used. They include modulation type, bit rate, spreading codes (CDMA), number of carriers (OFDMA), etc. as well as the ability to accept new functions e.g. a new modulation scheme. Armed with the

5 capability information the base station then selects the most appropriate software to download (or upload) from the mobile. This software does not have to contain actual code which is run on either one of the terminals, that is the PP or FP, it could be purely configuration information. As an example the following message sequence chart shows how a flexible air interface could be

10 set up between a PP and FP. In this example the PP communicates it can transmit and receive RF modulation of any of three types (BPSK, QPSK and DQPSK), the FP can decide which modulation type is used, and instruct the PP to do so, by transferring a simple code which refers directly to the chosen modulation type.



This configuration of the air interface permits a simple testing of the air interface to be included in which a call is set up to exercise the physical layer and assesses the potential quality of service (QoS) for the link. Thus the air interface is tested to ensure that configuration has taken place without error.

5        The testing scheme comprises the transmission of a known test pattern of data, which is generated by the FP and known "a prioria" by the PP.

The flexible air interface allows the adoption of adaptive spectrum management, where the FP can allocate different amount of spectrum to users dependant not only on the demands of the mobiles, but on the optimum usage  
10 of the available spectrum.

Caching can be used for frequently selected software upgrades.

In order to give another illustration of the method in accordance with the present invention, an example will be given of a series of events for reconfiguration of the CRC.

- 15        1.     Decide to reconfigure the PP's or FP's CRC scheme in MAC layer.
2.     Interrogate MAC layer of PP or FP to be programmed for software MAP.
3.     Use built-in rules to discover if the PP or FP can have it's CRC  
20 scheme changed.
4.     If change is possible, then download to PP or FP either:
- New parameters for CRC scheme, or
  - new CRC scheme source code.

To reduce the amount of over the air transmission only the required  
25 function is transmitted plus any interface software required in building the new function into the actual implementation of the FP or PP. For example if the implementation was on an FPGA, then a compiler for the specific FPGA would also be required.

30        5.     If source code, the PP or FP configuration manager 40 (Figure 2) compiles a link-able binary, the compiler is a custom coded compiler specific for a particular platform. After compilation, the binary is linked in with other software. The software can run on a programmable

processor or on a dedicated ASIC or could also be used to configure an FPGA implementing the new function. One method of software reconfiguration would be to define an area of memory accessed by the processor that is used for a particular function, this area could be replaced when a new function is downloaded.

6. If parameters, then update parameter storage locations
7. Run a test program which tests the new configuration
8. Setup a new call with newly reconfigured PP or FP

Referring now to Figure 3, this shows a typical generic software transfer from a Software Defined Radio (SDR) server 50 to a SDR terminal 51, either a PP or FP.

The transfer takes place in a number of phases.

Initiation:

In step 52, the server 50 initiates a download request.

In step 53, the terminal 51 acknowledges the download request.

Mutual Authentication:

In step 54, the server 50 authenticates the terminal 51.

In step 55, the terminal 51 authenticates the service provider and network operator.

Capability Exchange:

In step 56, the server 50 requests the terminal 51 to transmit its capability data.

In step 57, the terminal 51 transmits its capability response.

In step 58, the server 50 selects the appropriate software entities and parameter sets to match the capability of the terminal 51 and opens a download channel. (If no matching set of parameters exist, the operation is terminated). Transmit download installation profile.

Download Acceptance Exchange:

In step 60, the server 50 transmits Download Installation Profile.

Download Acceptance Exchange:

In step 59, the terminal 51 selects the installation options and also accepts or rejects the terms. In step 60, the server 50 validates the selected options.

#### Software Download:

5 In step 62, the server 50 downloads code modules including capability tables and delivery wrappers for each entity procedure.

In step 63, the terminal 51 tests the delivery integrity. Also it requests retransmissions as appropriate.

In step 65, the terminal 51 acknowledges safe receipt.

10 In step 64, the server 50 terminates the downloading.

Although the present invention has been described with respect to DECT, it is equally applicable to other one or two-way communication systems having a radio interface, a corded/landline interface or a combination of both between the PP and FP. In the case of a one-way communication system, control signalling is two-way and the system may be implemented using a  
15 separate one-way communications system for example a DAB (digital audio broadcasting ) system with a GSM two-way control channel.

In the present specification and claims the word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. Further,  
20 the word "comprising" does not exclude the presence of other elements or steps than those listed.

From reading the present disclosure, other modifications will be apparent to persons skilled in the art. Such modifications may involve other features which are already known in the design, manufacture and use of  
25 reconfigurable communication networks/terminals therefor and which may be used instead of or in addition to features already described herein.

#### Industrial Applicability

Radio platforms which are configurable/reconfigurable using software.

## CLAIMS

1. A method of operating a radio system comprising first and second terminals, the method comprising configuring/reconfiguring one of said first and second terminals by a process of service negotiation with the other of said first and second terminals.

2. A method of operating a radio system comprising first and second terminals, the method comprising one of said first and second terminals transmitting message giving parameters relating to its capabilities, and the other of the first and second terminals receiving the message and configuring/reconfiguring itself in accordance with the received parameters.

3. A method as claimed in claim 1 or 2, characterised in that the one of said first and second terminals initiating the configuring/reconfiguring operation transmits the required function plus software required in building a new function into an actual implementation on the other of said first and second terminals.

4. A method as claimed in Claim 1, 2 or 3, characterised by testing the air interface to ensure that configuration/reconfiguration has taken place without error.

5. A communications system comprising first and second terminals which are able to communicate with each other, wherein at least one of the first and second terminals has means for configuring/reconfiguring itself by a process of service negotiation.

6. A communications system comprising first and second terminals which are able to communicate with each other, wherein at least one of the first and second terminals has means for configuring/reconfiguring itself in

response to the receipt of a message transmitted by said other of the first and second terminals giving parameters relating to its capabilities.

7. A communications system as claimed in claim 6, characterised in  
5 that the first and second terminals are radio terminals.

8. A communications system as claimed in claim 5, 6 or 7,  
characterised in that the first and second terminals each have a software  
interface including a memory and means for altering the memory, in that at  
10 least a portion of the area of the memory has a part allocated to respective  
software functions and in that the memory altering means replaces the area of  
a respective part in response to a new function being downloaded.

9. A terminal for use in a communication system in which one  
15 terminal can configure/reconfigure another terminal by service negotiation, the  
terminal comprising a transceiver, a memory for storing software functions,  
and a processor for controlling the operation of the terminal in accordance with  
stored software functions, at least one of the software functions being alterable  
in response to the receipt of a message containing the new software function  
20 plus interface software required by the processor in building a new function  
into an actual implementation on the terminal.

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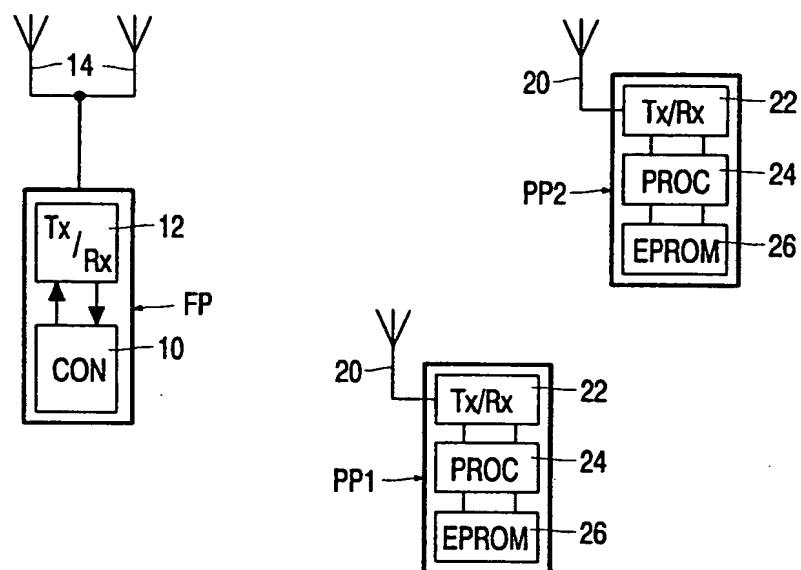


FIG. 1

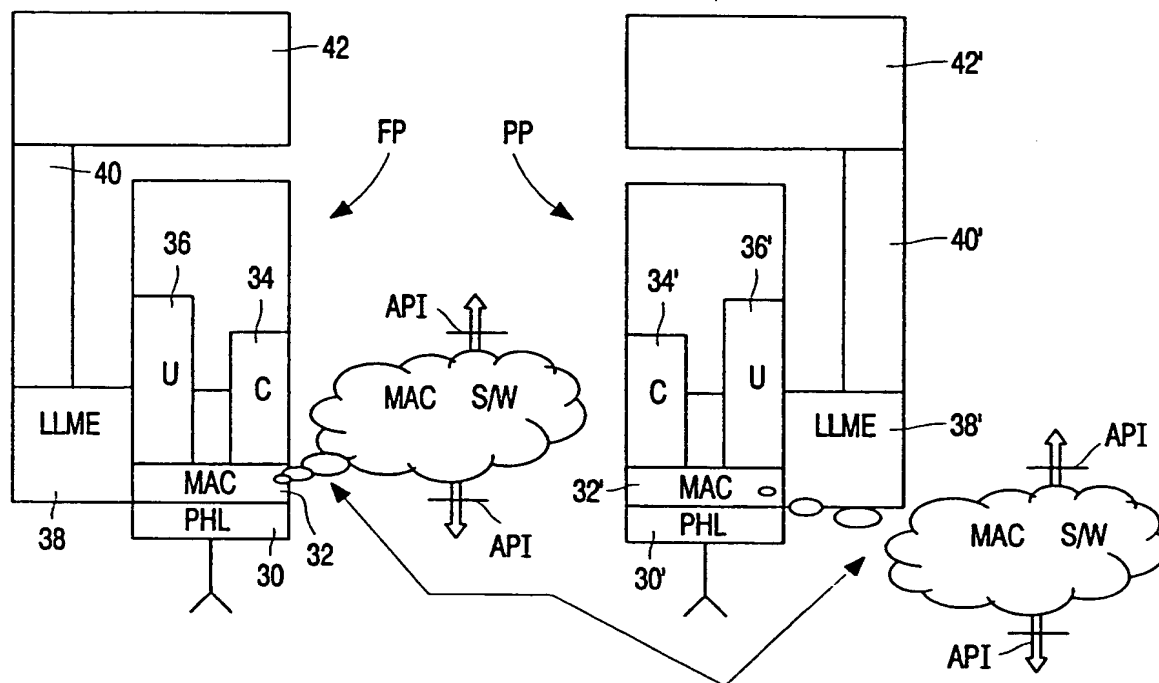


FIG. 2



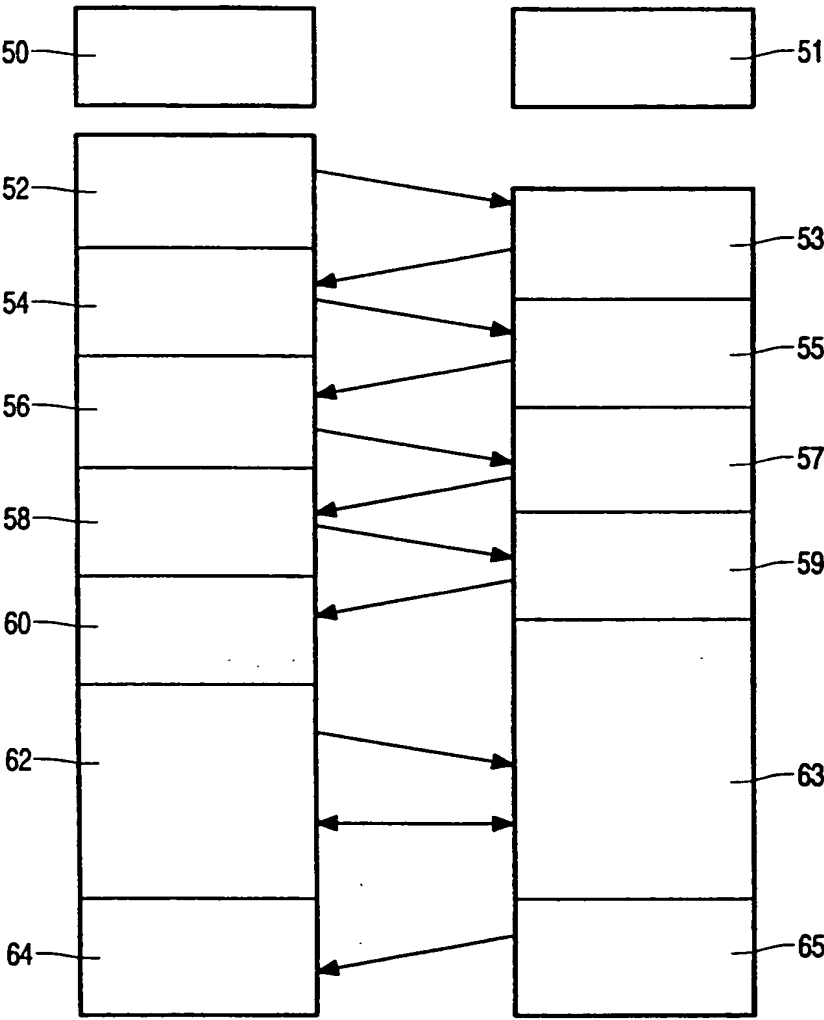


FIG. 3

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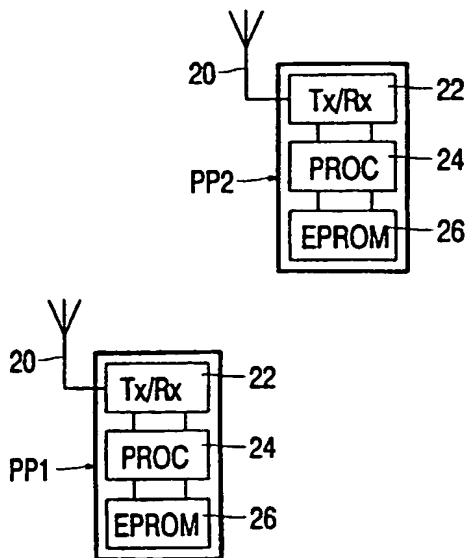
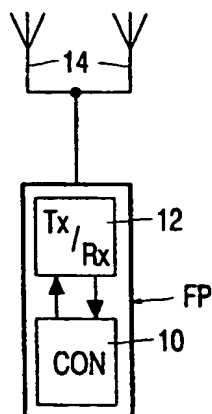
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- (72) Inventors: **BUCKNELL, Paul;** Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **MOULSLEY, Timothy, J.;** Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). *For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: **RECONFIGURABLE COMMUNICATION NETWORK**



(57) Abstract: A communication system comprises first and second terminals (FP, PP) which are able to communicate at least control messages to each other. At least one of the first and second terminals has means for configuring/reconfiguring itself by a process of service negotiation with the other of the first and second terminals. Each of the terminals comprises a transceiver, a memory for storing software functions, and a processor for controlling the operation of the terminal in accordance with stored software functions. At least one of the software functions is alterable in response to the receipt of a control message containing the new software function plus interface software required by the processor in building a new function into an actual implementation on the terminal. The communication system may be a cordless and/or

cellular telephone system in which the configuration/reconfiguration messages are sent over-the-air or a corded system in which configuration/reconfiguration messages are relayed by landline.

WO 00/65851 A3

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/03068

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q7/32

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 825 791 A (BRITISH TELECOMM) 25 February 1998 (1998-02-25) column 2, line 7 -column 3, line 17 column 5, line 14 -column 6, line 11 ----	1-3, 5-7, 9
X	WO 98 38820 A (ERICSSON TELEFON AB L M) 3 September 1998 (1998-09-03) page 2, line 24 -page 3, line 19 page 4, line 7 - line 26 ----	1, 3-5, 8, 9
A	EP 0 804 045 A (TELIA AB) 29 October 1997 (1997-10-29) column 1, line 36 -column 3, line 34 -----	5, 8

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Dionisi, M

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0825791 A	25-02-1998	AU 713402 B	02-12-1999
		AU 1553097 A	28-08-1997
		AU 3950197 A	06-03-1998
		CA 2242180 A	14-08-1997
		CN 1211375 A	17-03-1999
		EP 0880865 A	02-12-1998
		WO 9729606 A	14-08-1997
		WO 9807287 A	19-02-1998
		NO 983676 A	11-08-1998
WO 9838820 A	03-09-1998	US 6023620 A	08-02-2000
		AU 6640398 A	18-09-1998
		BR 9807612 A	22-02-2000
		CN 1249112 T	29-03-2000
		DE 19882136 T	05-01-2000
EP 0804045 A	29-10-1997	NO 971783 A	27-10-1997
		SE 9601558 A	25-10-1997

***This Page Blank (uspto)***